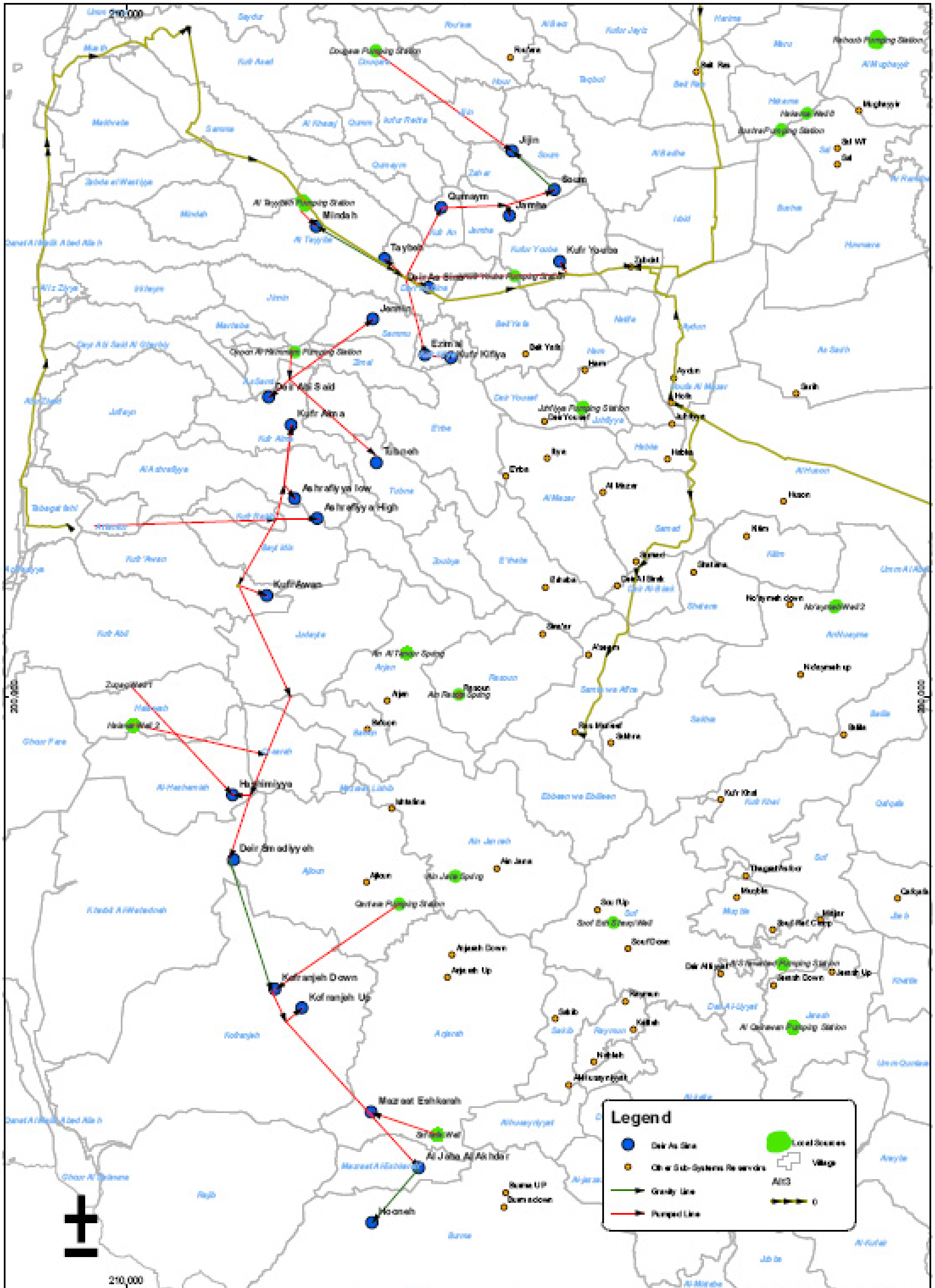
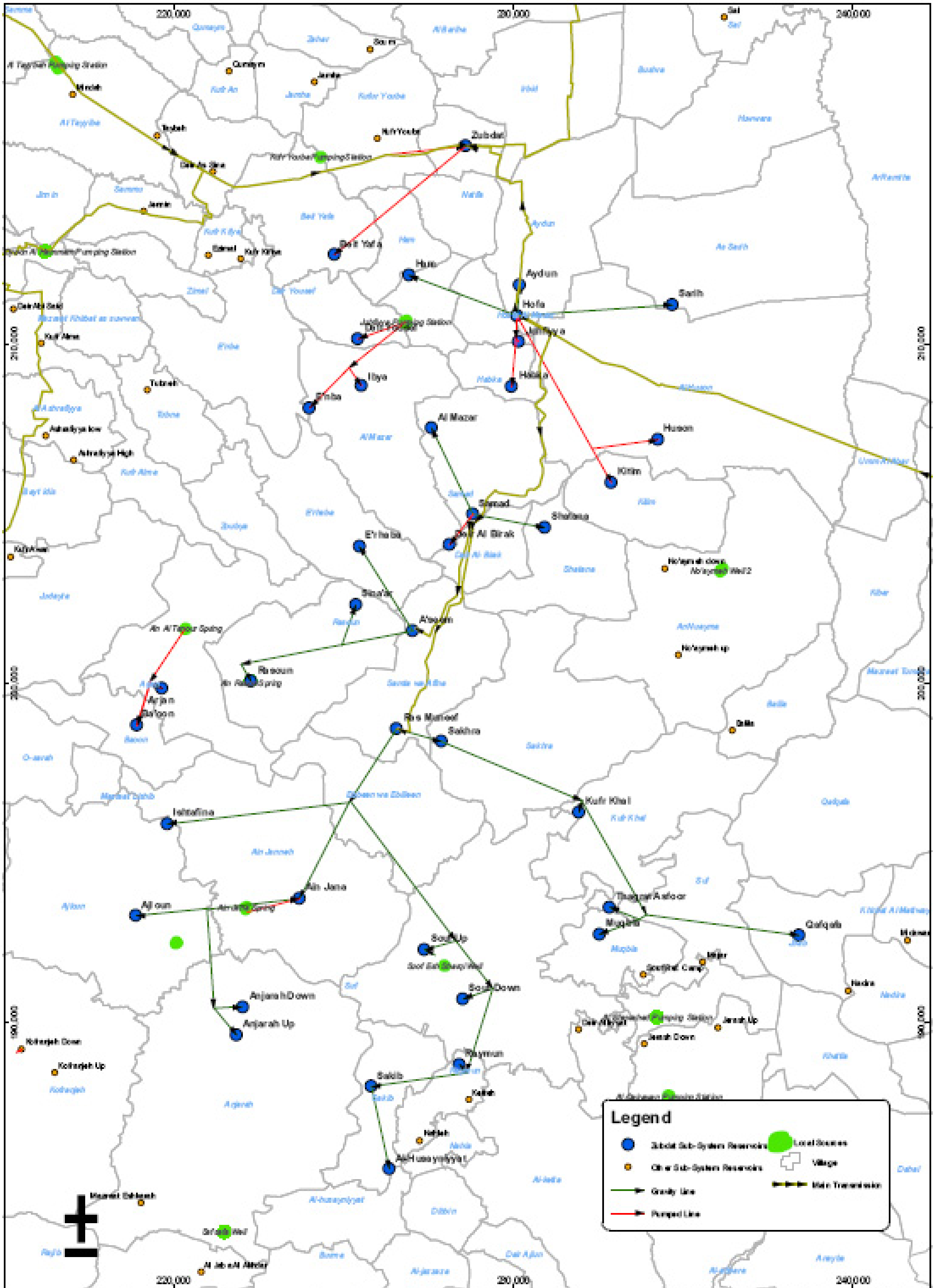
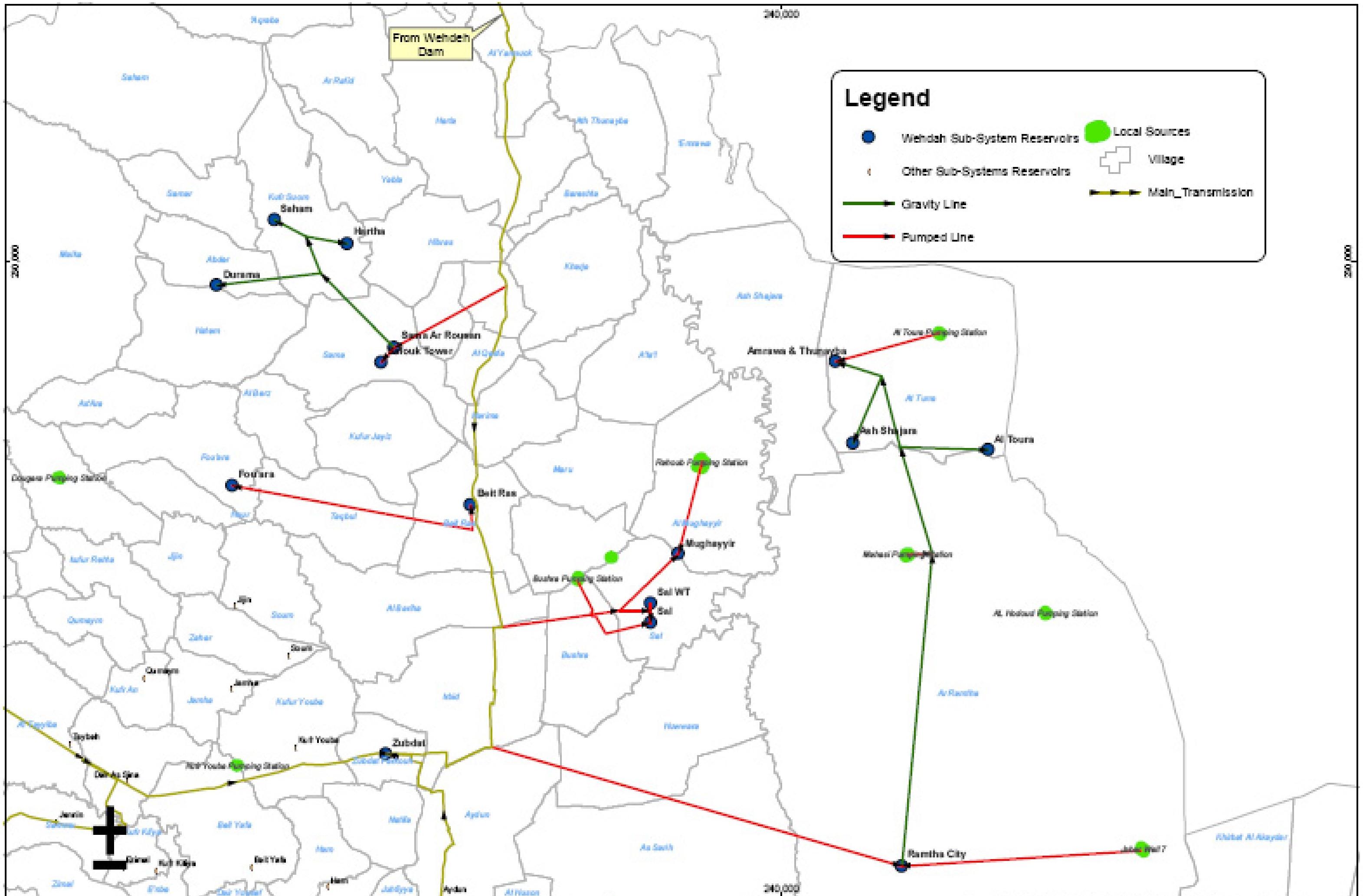


DRAWING SCALE 1:025,000	THE HASHEMITE KINGDOM OF JORDAN MINISTRY OF WATER AND IRRIGATION WATER AUTHORITY	CDM International Inc.	NORTHERN GOVERNORATES WATER TRANSMISSION SYSTEM FEASIBILITY STUDY Alternative 2: Deir As Sina Sub-System Plan	3029-42334 74-36



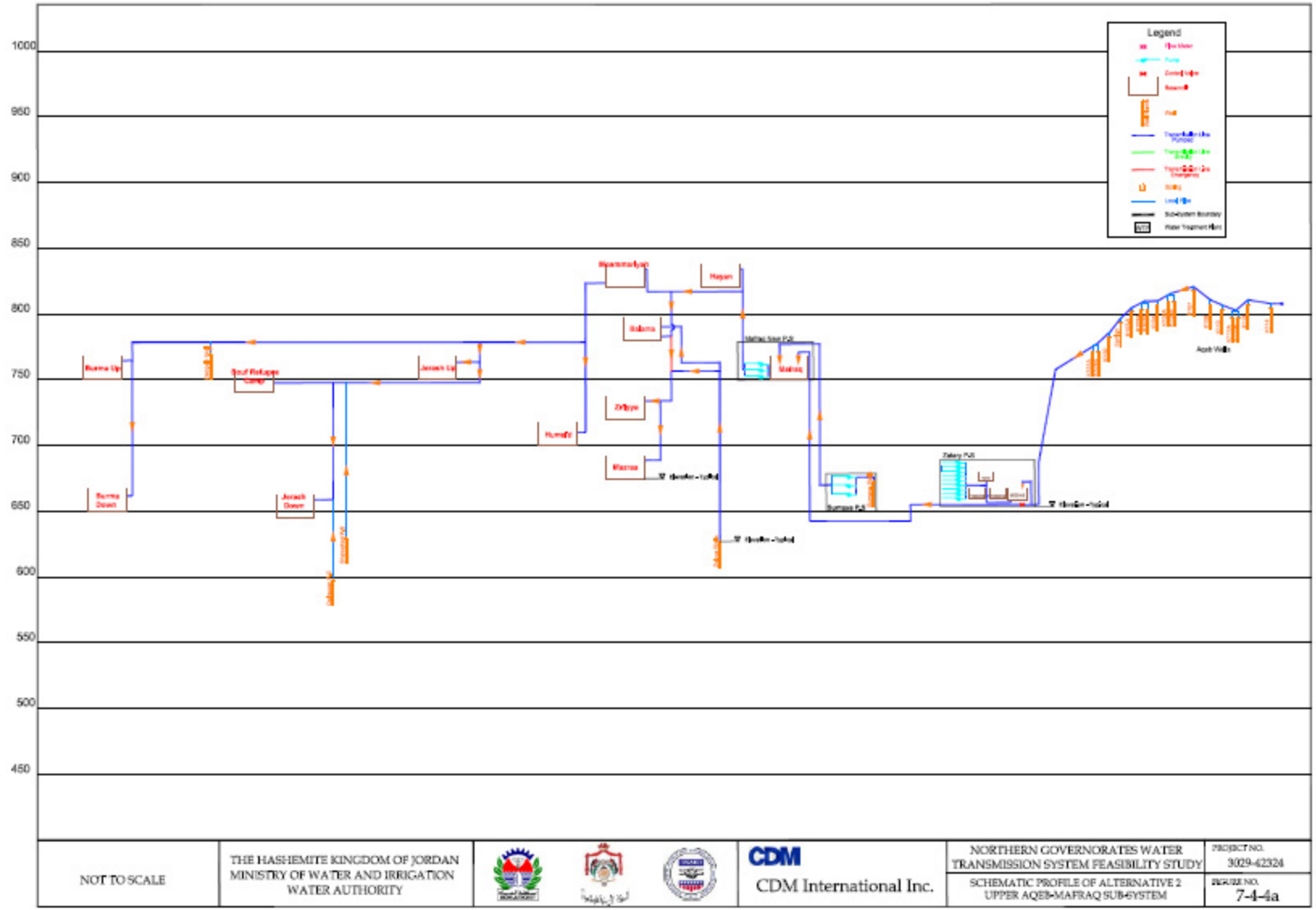
Legend
Zubdat Sub-System Reservoirs
Other Sub-System Reservoirs
Gravity Line
Pumped Line
Local Sources
Village
Main Transmission
Zubdat
Hofa
Aydun
Sarih
Huson
Kitim
Hum
Beit Yafa
Ibya
Erhaba
Al Mazar
Samad
Al Birak
Shafana
Habaka
E'rhaba
A'saum
Rasoun
Ras Munief
Sakhra
Kufr Khal
Ishtafina
Ain Jana
Ajloun
Anjarah Down
Anjarah Up
Souf Up
Souf Down
Raymun
Sakib
Al Husayniyyat
Qafqafa
Mugairat
Thugrat Asfoor
Ajyan
Sakhra
Legend

DRAWING SCALE	THE HASHEMITE KINGDOM OF JORDAN MINISTRY OF WATER AND IRRIGATION WATER AUTHORITY	CDM International Inc.	NORTHERN GOVERNORATES WATER TRANSMISSION SYSTEM FEASIBILITY STUDY Alternative 2: Zubdat Sub-System Plan	PROJECT No. FIGURE No. 74-3a

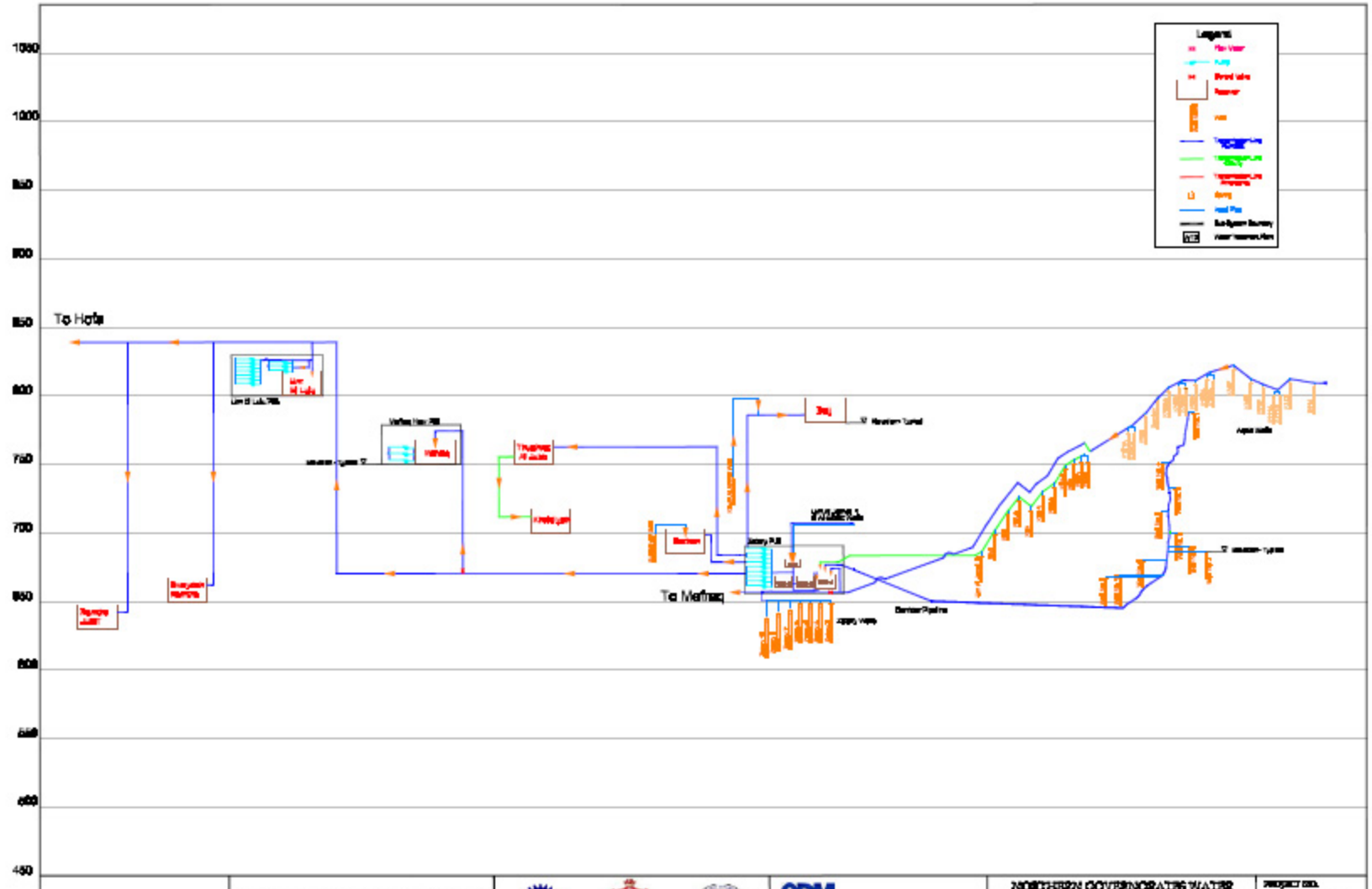


From Wehdeh Dam
Legend
Wehdah Sub-System Reservoirs
Other Sub-Systems Reservoirs
Gravity Line
Pumped Line
Local Sources
Village
Main_Transmission
240,000
250,000
Saham
Hartha
Durama
Samа Ar Rousan
Fou'ara
Beit Ras
Amrawa & Thunayba
Ash Shajara
Al Toura
Mughayyir
Sal WT
Sal
Zubdat
Ramtha City
Al Toura Pumping Station
Rehoab Pumping Station
Bushra Pumping Station
Mehesi Pumping Station
Al Hodoud Pumping Station
Dougara Pumping Station
Kufr Youba Pumping Station
Taybeh
Deir As Sina
Jenin
Qumaym
Jenha
Kufr Youba
Soum
Bait Yafa
Harri
Aydun
Kufr Kifya

DRAWING SCALE: 1:100,000	THE HASHEMITE KINGDOM OF JORDAN MINISTRY OF WATER AND IRRIGATION WATER AUTHORITY	CDM International Inc.	NORTHERN GOVERNORATES WATER TRANSMISSION SYSTEM FEASIBILITY STUDY	PROJECT No. 3029-42324
			Alternative 2: Wehdah Sub-System Plan	FIGURE No. 7-4-3f



NOT TO SCALE	THE HASHEMITE KINGDOM OF JORDAN MINISTRY OF WATER AND IRRIGATION WATER AUTHORITY		CDM International Inc.	NORTHERN GOVERNORATES WATER TRANSMISSION SYSTEM FEASIBILITY STUDY SCHEMATIC PROFILE OF ALTERNATIVE 2 UPPER AQEB-MAFRAQ SUB-SYSTEM	PROJECT NO. 3029-42324 FIGURE NO. 7-4-4a



NOT TO SCALE

THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF WATER AND IRRIGATION
WATER AUTHORITY

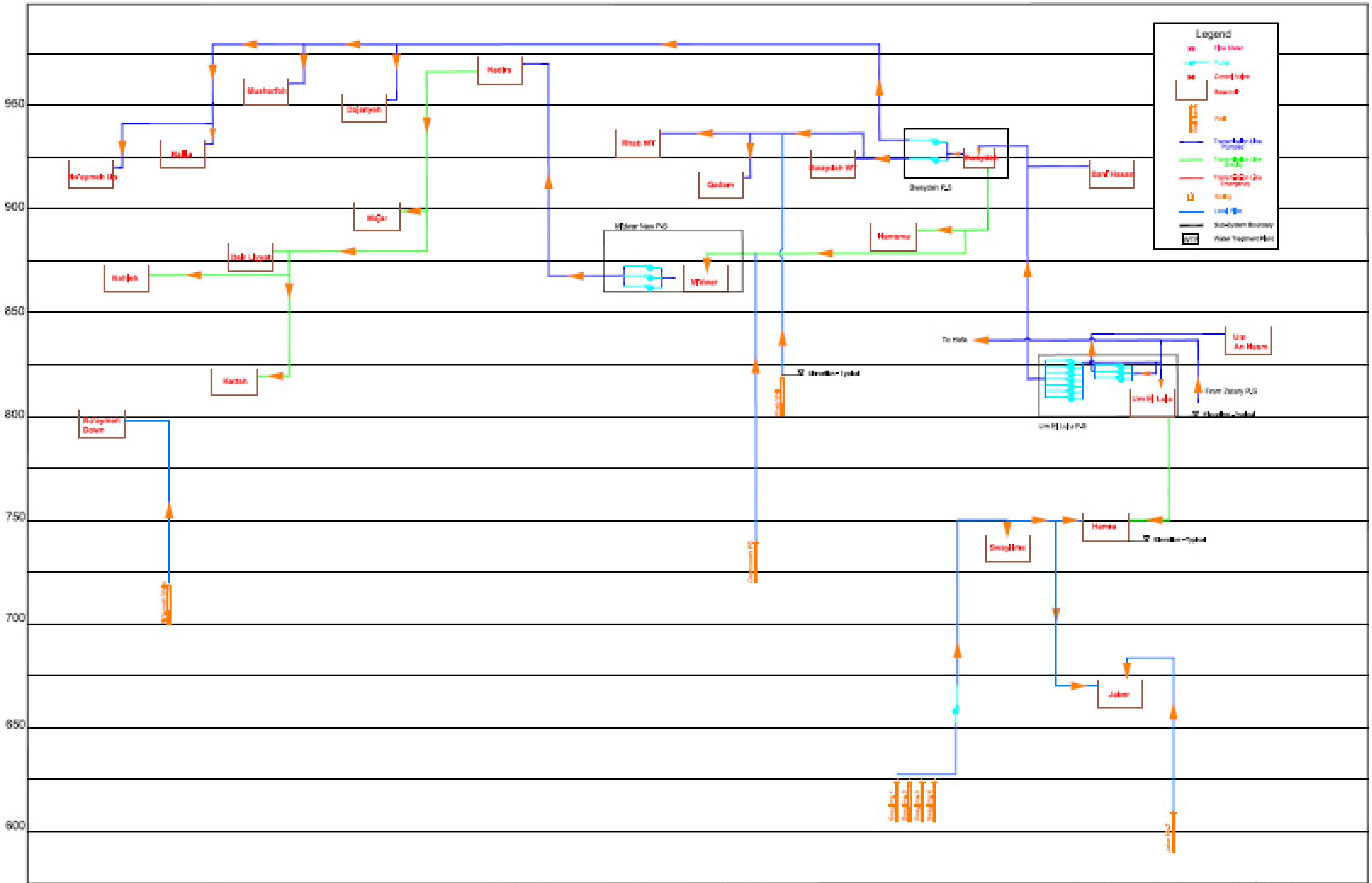
CDM
CDM International Inc.

NORTHERN GOVERNORATES WATER TRANSMISSION SYSTEM FEASIBILITY STUDY

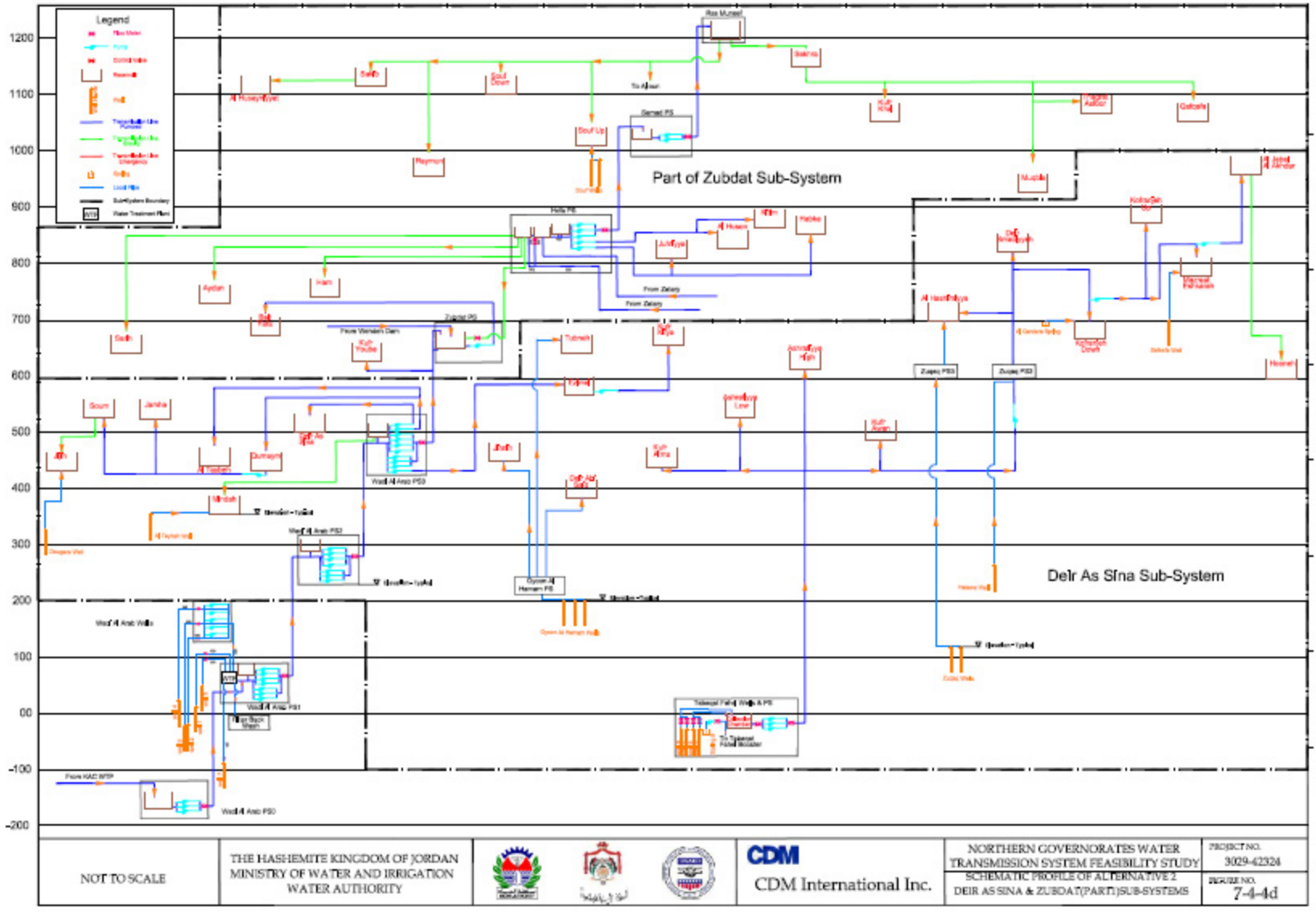
SCHEMATIC PROFILE OF ALTERNATIVE 2 ZATARY SUB-SYSTEM

PROJECT NO. M25-42324

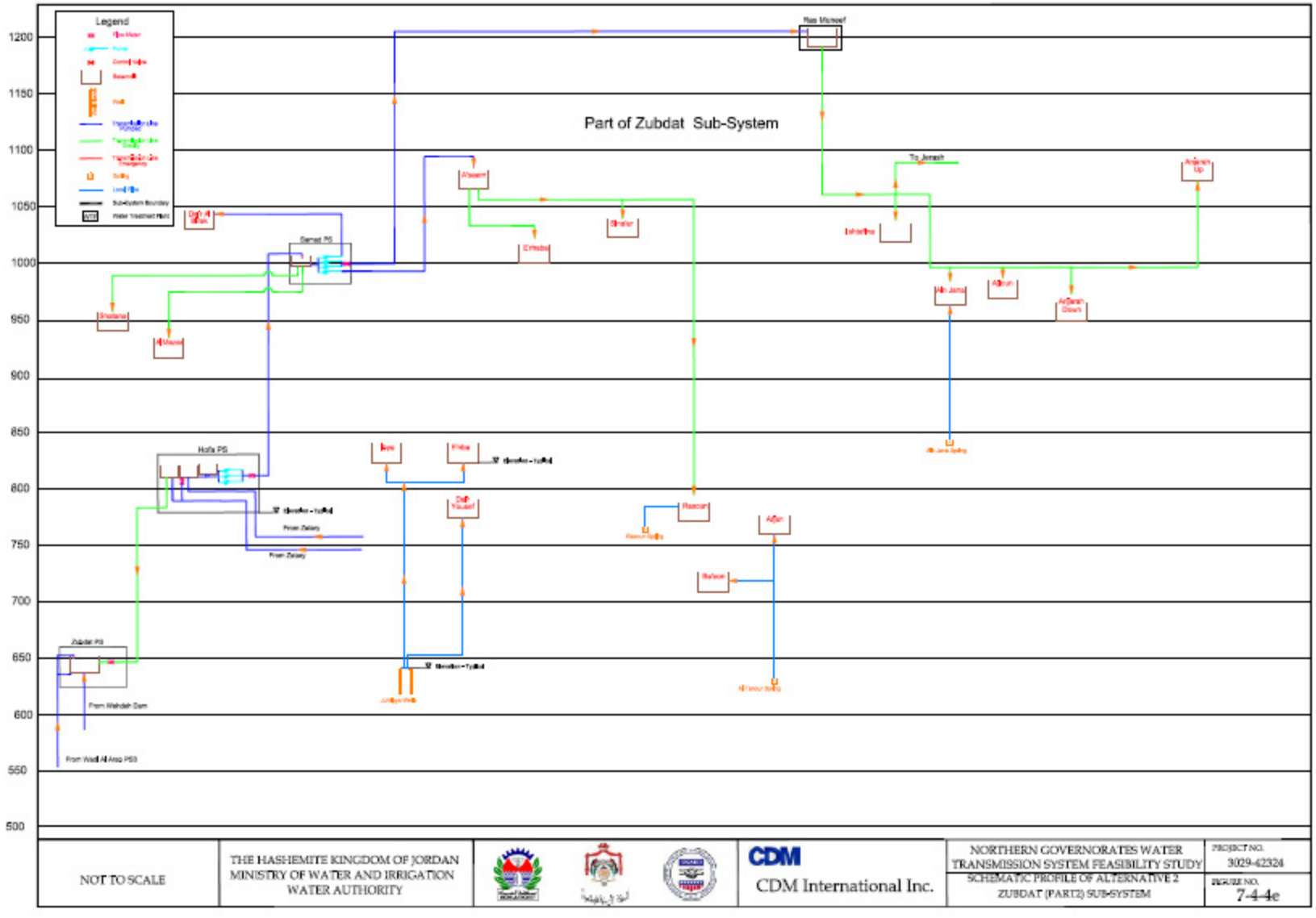
DRAWING NO. 7-4-4b



NOT TO SCALE	THE HASHEMITE KINGDOM OF JORDAN MINISTRY OF WATER AND IRRIGATION WATER AUTHORITY	CDM CDM International Inc.	NORTHERN GOVERNORATES WATER TRANSMISSION SYSTEM FEASIBILITY STUDY	PROJECT NO. 3029-42324
			SCHEMATIC PROFILE OF ALTERNATIVE 2 UM EL-LULU SUB-SYSTEM	FIGURE NO. 7-4-4c



NOT TO SCALE	THE HASHEMITE KINGDOM OF JORDAN MINISTRY OF WATER AND IRRIGATION WATER AUTHORITY		CDM CDM International Inc.	NORTHERN GOVERNORATES WATER TRANSMISSION SYSTEM FEASIBILITY STUDY SCHEMATIC PROFILE OF ALTERNATIVE 2 DEIR AS SINA & ZUBDAT(PART)SUB-SYSTEMS	PROJECT NO. 3029-42324 FIGURE NO. 7-4-4d



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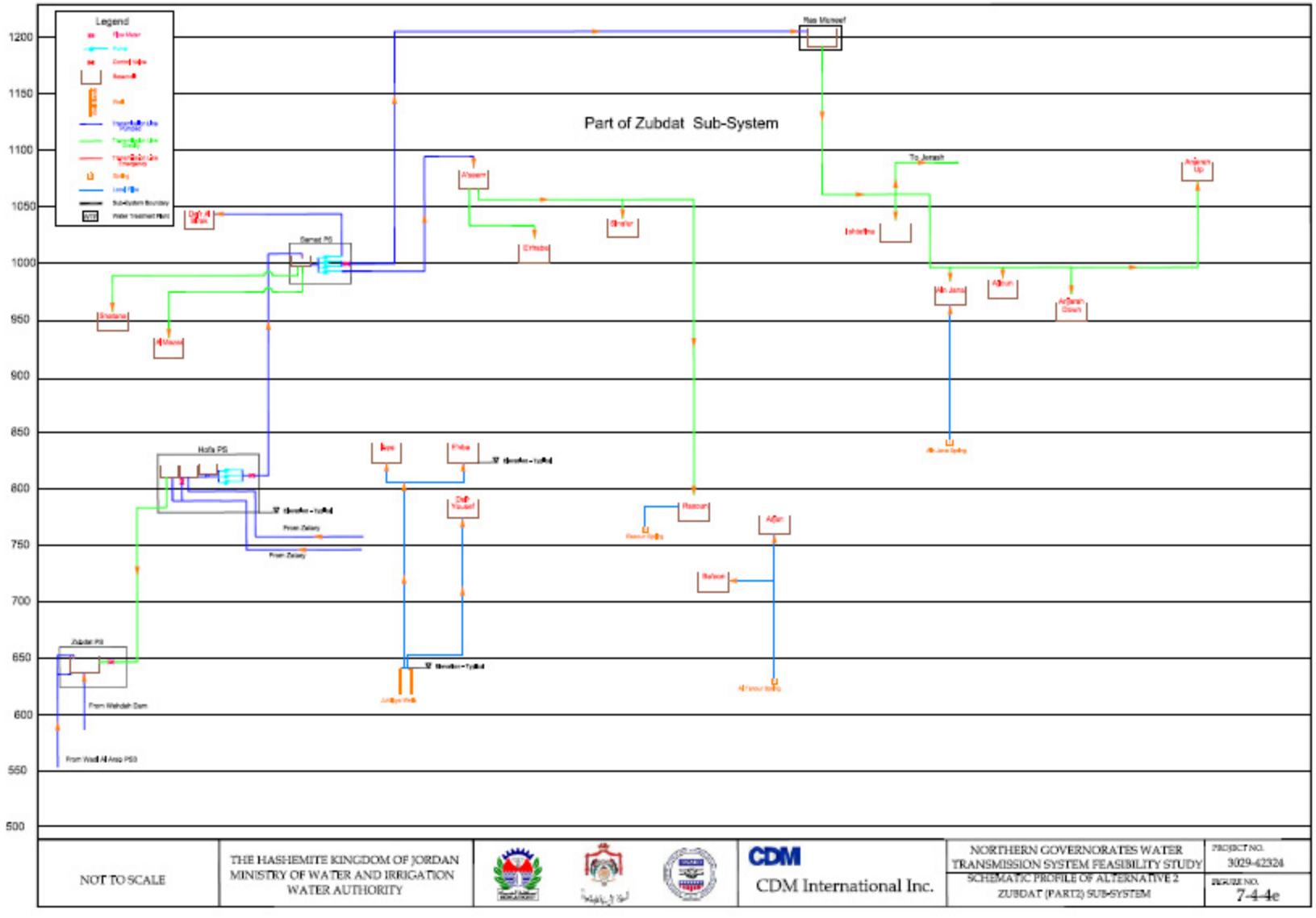
NORTHERN GOVERNORATES WATER TRANSMISSION SYSTEM FEASIBILITY STUDY

SCHEMATIC PROFILE OF ALTERNATIVE 2
ZUBDAT (PART2) SUB-SYSTEM

PROJECT NO. 3029-42324

FIGURE NO. 7-4-4e



NOT TO SCALE

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WATER AUTHORITY

CDM International Inc.

NORTHERN GOVERNORATES WATER TRANSMISSION SYSTEM FEASIBILITY STUDY

SCHEMATIC PROFILE OF ALTERNATIVE 2
ZUBDAT (PART2) SUB-SYSTEM

PROJECT NO. 3029-42324

FIGURE NO. 7-4-4e

7.5 TRANSMISSION ALTERNATIVE 3

7.5.1 Guidelines

- Update the versions of the systems proposed by the previous studies of SOGREAH and SAFEGE.

7.5.2 Description

Figures 7-5-1 and 7-5-2 show a layout of the suggested Alternative 3 transmission system and a layout of the locations of the existing and new pipelines respectively.

As the guideline indicates, Alternative 3 is an amended version of the proposed systems developed by SOGREAH and SAFEGE. The amendments are introduced to take into account the changes expected in the future such as the introduction of the Corridor wells and the Wehdeh Dam project.

The alternative follows the simple approach method which is basically the current way of transferring the water in the Northern Governorates. The general layout of Alternative 3 and a layout showing the locations of the existing/new pipelines are shown in **Figures 7-5-1 and 7-5-2.**

East Transmission
Zatary Sub-System: (See plan and schematic profile on **Figures 7-5-3a, 7-5-3b, 7-5-4a and 7-5-4b**). The Zatary sub-system which now collects the water from all wells is responsible for pumping water from Zatary PS to Baij, Sarhan and Jabir reservoirs. It also pumps to Um El-Lulu and Hofa through a new proposed pipeline of 1100mm serving on the way several demand points in Mafraq such as Mafraq, Hamra and Swaylima reservoirs, and a couple in Ramtha, which include Bwaydah, Ramtha, and JUST reservoirs.

Sumaya wells, however, which in Alternative 1 lead its own sub-system will in this Alternative be only serving Mafraq reservoir as its local source.

Khaldiyeh and Thughrat Al-Jubb reservoirs are served through the existing Khaldiyeh PS which is served by gravity from Zatary reservoirs.

Um El-Lulu Sub-System: (See plan and schematic profile on **Figures 7-5-3c and 7-5-4c** respectively). Two pressurized pipelines leave Um El-Lulu PS.
The first is a 500mm pipeline which serves Um Naam and Bani Hasan Reservoirs, and continues its path to serve the high medium pressure zones of Jerash at elevations ranging between 1070m and 645m.

The second pipeline is delivering water to Bwaydah PS which distributes the water in four directions. It pumps water in two different pipelines towards Dajanyeh and Bwaydah Water tower. Another existing pipeline of 300mm is used to supply by gravity the remaining parts of Mafraq, including Rhab, Qadam, Moammariyyeh, Balama, Humaid, Zniyya and Mazraa whose reservoirs vary in elevation between 925m and 675m.

The fourth pipeline of 400mm, on the other hand, delivers the demands of Hamama and Midawar reservoirs by gravity, whilst the proposed Midawar PS delivers water to Nadira reservoir.

West Transmission

Schematic profiles in **Figures 7-5-4d, 7-5-4e, and 7-5-4f** show the new water sub-systems for Alternative 3. As was the case in the description of Alternative 2, only differences from Alternative 1 will be discussed.

Wadi Al Arab and Deir As Sina subsystem: (See plan and schematic profile on **Figures 7-5-3d and 7-5-4d** respectively).No changes took place in Wadi Al Arab system. However, the Deir As Sina system has changed in the following manner. Al Taybeh and Mindah reservoirs will be fed by gravity from Deir As Sina reservoir. To its south, Deir As Sina reservoir also feeds Jinnin and Deir Abi Said reservoirs from which water is pumped to Kufr Alma reservoir. And Oyoon Al Hamam water is pumped to Deir Abi Said reservoir in a separate pipeline.

Kufr Alma reservoir in this alternative is only pumping water to Tubneh and Ashrafiyya High reservoir. The latter then feeds by gravity Ashrafiyya Low and Kufr Awan reservoirs. The western parts of Ajloun governorate are not served by this sub-system and therefore two PSs were cancelled.

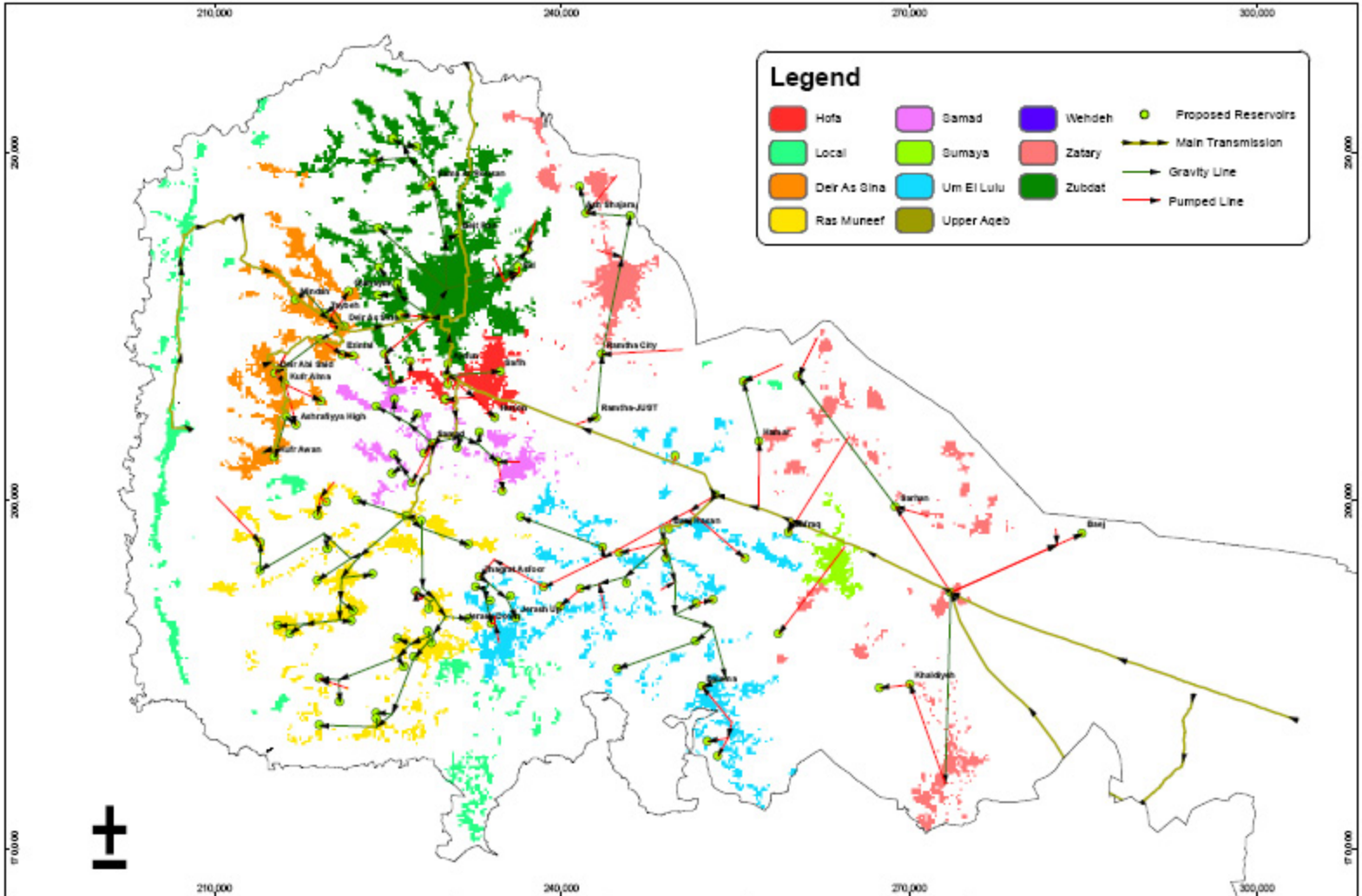
From Wadi Al Arab PS3 to the north only Qumaym reservoir is fed from this sub-system.

Zubdat subsystem: (See plan and schematic profile on **Figures 7-5-3e, 7-5-3f, 7-5-4e and 7-5-4f** respectively).The reservoirs in Irbid governorate that had been eliminated from Deir As Sina Sub-System, are now fed by gravity from Zubdat reservoir. Reservoirs of Ham, Deir Yousef and Beit Yafa will be served by the Juhfiyya wells as well as Zubdat PS. On the other hand, Ibya and E'nba reservoirs which were originally served from the Juhfiyya wells, will be fed from Samad PS by Al Mazar pipeline.

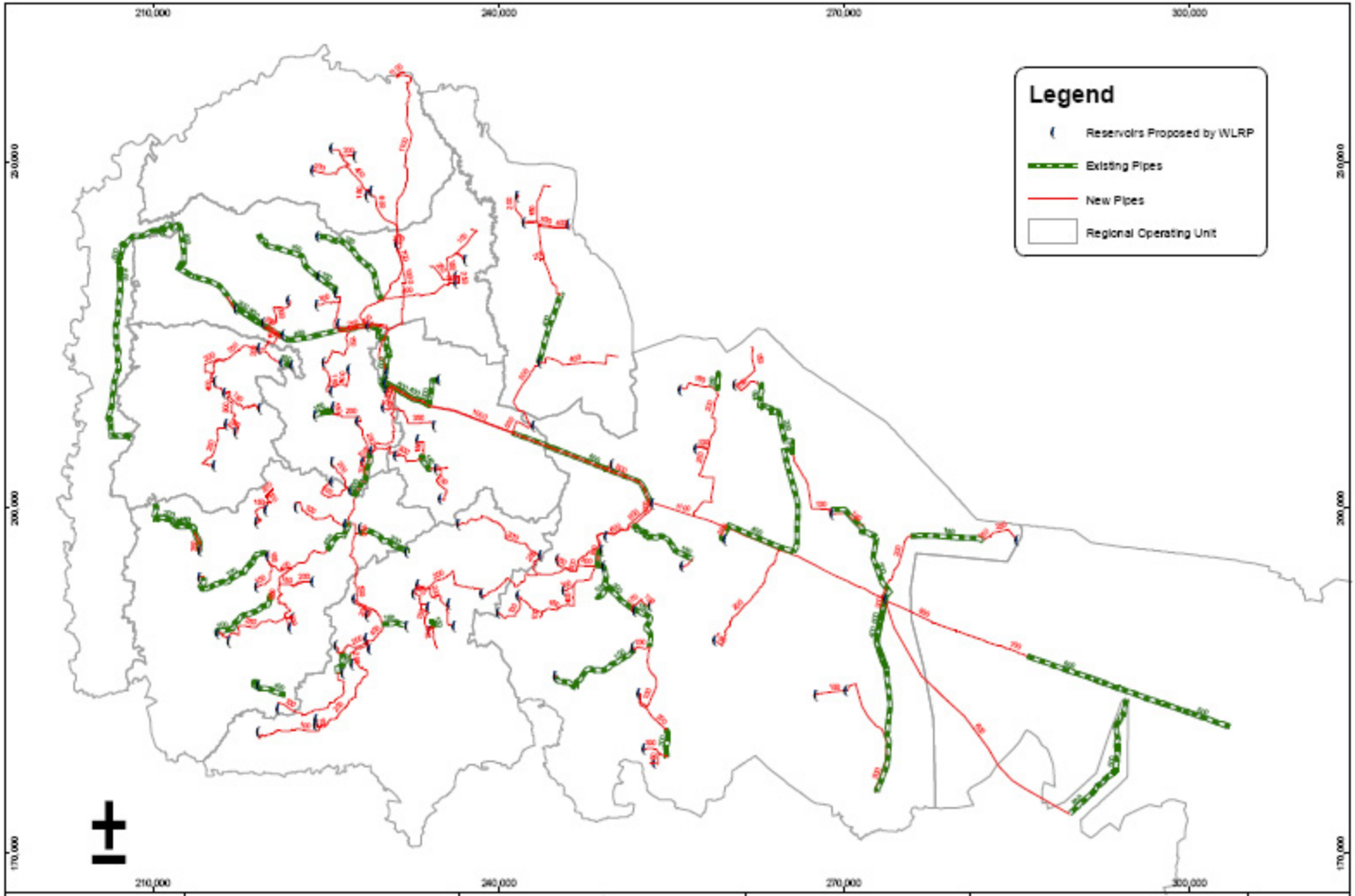
In this alternative, Aydun reservoir is fed through a new 400mm pipeline by direct pumping from Zubdat PS. Kufr Youba reservoir is also fed by gravity from Zubdat reservoir.

Al Huson reservoir is fed from Habka pipeline. While the reservoirs of Kitim and No'aymeh in Bani Obaid, are served from Samad PS.

In this alternative, similar to Alternative 2, the A'seem branch feeds A'seem, E'rhaba and Sina'ar. While Rasoun, Arjan, and Ba'oon are fed from Ras Muneef. Another Branch from Ras muneef, feeds other reservoirs in Ajloun by gravity from the Deir Smadiyyeh pipeline. The last branch from Ras Muneef goes in the direction to Jerash governorate reservoirs, with a branch to Kufr Khal. The Ras Muneef to Jerash pipeline also supplies Al Jabal Al Akhdar and Mazraat Eshkarah reservoirs in Ajloun governorate.



DRAWING SCALE: 1:300,000	THE HASHEMITE KINGDOM OF JORDAN MINISTRY OF WATER AND IRRIGATION WATER AUTHORITY		CDM CDM International Inc.	NORTHERN GOVERNORATES WATER TRANSMISSION SYSTEM FEASIBILITY STUDY	PROJECT No. 3029-42324
				Alternative 3 Layout	REVISION No. 7-5-1



DRAWING SCALE: 1:300,000	THE HASHEMITE KINGDOM OF JORDAN MINISTRY OF WATER AND IRRIGATION WATER AUTHORITY		CDM CDM International Inc.	NORTHERN GOVERNORATES WATER TRANSMISSION SYSTEM FEASIBILITY STUDY Alternative 2 Existing / New Pipelines Layout	PROJECT No. 3029-42324 FIGURE No. 7-5-2